The estimates that this approach generates suggest that for DoD as a whole, the ratio of depot maintenance funding to force structure in 1994 was equal to the 1988-1989 (pre-Desert Shield/Desert Storm) average (see Figure 17). From this overall perspective, depot maintenance appears to be funded at a level that could support future readiness. Indeed, there could be some room for further reductions in depot maintenance funding as the force structure declines. The ratio of DoD's 1994 depot maintenance funding to the 1999 force structure is 9 percent above the average before Desert Shield/Desert Storm. (Unless otherwise specified, all of the depot maintenance figures are consistent with the President's 1994 budget, adjusted for Congressional action.)

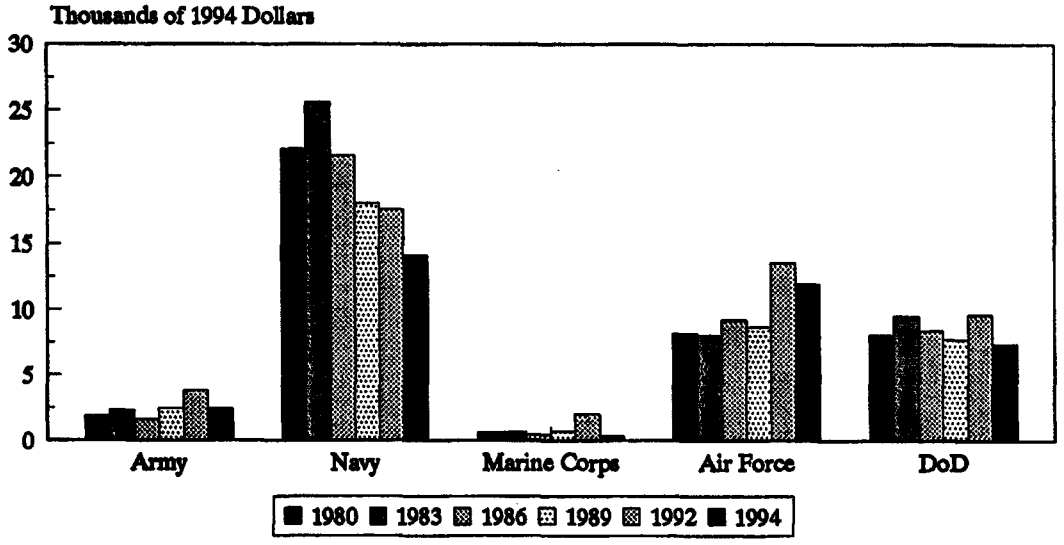
The figure for DoD as a whole masks some apparent shortfalls within the services, however. In the Navy, depot maintenance funding relative to force structure is now about 21 percent below the 1988-1989 average; in the Marine Corps, it is 43 percent below the 1988-1989 average. Because there may be little sense in overhauling a ship that is scheduled to be retired, it might be more appropriate to compare today's funding level with future force levels. Yet even if the Navy and Marine Corps were at their planned 1999 force levels, current depot maintenance funding relative to force structure would be 3 percent below the 1988-1989 average for the Navy and 42 percent below the 1988-1989 average for the Marine Corps.

Provided that equipment is in good condition now, one or two years of funding that is below the historical standard may not pose a serious threat to readiness. This is particularly true in the Navy, whose requirements for ship overhauls typically fluctuate from year to year. Moreover, the cost of bringing current funding up to the level that might be required to support the planned 1999 force structure does not appear very great: an additional $100 million for the Navy and $16 million for the Marine Corps. Again, these estimates are uncertain because of changes in the composition of the force structure and changes in the prices that DoD depots charge. If the overhead costs associated with excess capacity in DoD depots result in price increases that exceed the general rate of inflation in the economy, the actual shortfall in depot maintenance could be greater than these figures suggest.

In the Army and Air Force, by contrast, funding for depot maintenance in 1994 is high relative to force structure: 20 percent and 50 percent, respectively, above the 1988-1989 levels.[9] As noted earlier, part of the reason

9. These estimates are adjusted to take into account both changes in the way in which depot-level reparable items and interim contractor support are funded and shifts of Air Force work from intermediate maintenance facilities to depots.

FIGURE 17. DEPOT MAINTENANCE FUNDING RELATIVE TO FORCE STRUCTURE



SOURCE: Congressional Budget Office based on Department of Defense data.

NOTES: Figures were calculated using the number of active-duty personnel in the strategic and tactical Defense Planning and Programming Categories as a proxy for force structure.

Funding reflects operation and maintenance appropriations for depot maintenance of active-component equipment. Funding for depot-level reparables is excluded in all years.

could be that equipment inventories have not necessarily fallen as rapidly as force structure. To the extent that this explains the high ratio, it would be possible to reduce depot maintenance funding for these services without reducing readiness from its current level. (The impact would instead be to delay increases in readiness in units that do not now have their full complement of equipment, to delay increases in sustainability associated with having larger reserves of serviceable assets that are held outside units, or to delay increases in capability in units that would receive more modern equipment.) A number of other factors, however, may contribute to high depot maintenance costs relative to force structure. In particular, the fixed costs associated with DoD's depot maintenance facilities are likely to play a role. To the extent they are a factor, requirements for depot maintenance funding will remain high relative to force structure until consolidation and base closures eliminate any excess capacity.

THE SUPPLY OF SECONDARY ITEMS

Virtually all of the supplies DoD purchases that are not complete weapon systems or platforms are referred to as secondary items. They include the spare parts and assemblies that support weapon systems as well as consumable items such as food, fuel, and medical supplies. The readiness of military units depends on the ability of the DoD supply system to order the right secondary items, to maintain appropriate inventories, and to respond to requisitions. Indeed, the availability of spare parts was an important factor limiting the readiness of Air Force and Navy units during the late 1970s and early 1980s. Recently, senior military leaders have expressed concern about whether DoD will be able to purchase enough spare parts to ensure future readiness.

Supply readiness appears to be high today. Three frequently used indicators--the percentage of requisitions that DoD's wholesale system can fill from stocks on hand, the extent to which non-mission-capable aircraft are cannibalized to provide spare parts for other aircraft, and the percentage of equipment that is non-mission capable because of supply problems--all suggest that the DoD supply system is satisfying current requirements for peacetime operations. Moreover, despite Congressional restrictions on purchases by DoD, the total dollar value of its inventories of secondary items remains high.

Some caution is warranted, however, since these data do not indicate whether DoD's current inventories of parts in stock and on order are sufficient to meet the future needs of the department's newest weapon systems. The inventories of secondary items that are being released from war-

reserve stocks and from the downsizing of the force are unlikely to include the materiel that DoD needs for its most modern units.

Nonfinancial Indicators of Supply System Adequacy

The supply availability rate--the percentage of requisitions that the wholesale system can fill from stocks on hand--is one indicator of how well the wholesale supply system is functioning. In 1993, overall supply availability rates were 82 percent for the Navy's wholesale system, 86 percent for the Army's system, and 87 percent for the Defense Logistics Agency (see Figure 18).[10] These figures compare with a goal of 85 percent. A negative trend is apparent, however, in the rate for Navy aviation reparables: that rate fell from 81 percent in 1988 to 73 percent in 1993.[11]

Indicators of the supply problems encountered by operational units or maintenance depots reflect the adequacy of the entire supply system, both wholesale and retail. The cannibalization rate for aircraft is one such indicator, since cannibalization--the practice of using one aircraft as a source of spare parts for another--is only resorted to when the supply system is unable to provide the needed parts. In 1993, cannibalization rates were at a record low in the Air Force and at a relatively low--albeit increasing--level in the Navy (see Figure 19). Two other indicators of supply problems at the unit level, the percentage of time aircraft or ground equipment is non-mission capable because of supply problems and the number of days that ships experience C-3 or C-4 CASREPs because of supply delays, also indicate that the supply system is currently supporting a high level of readiness (see Figures 20 and 21). One exception to this conclusion is the non-mission-capable rate resulting from supply delays for Navy aircraft; although now stable, that rate appears relatively high by historical standards.

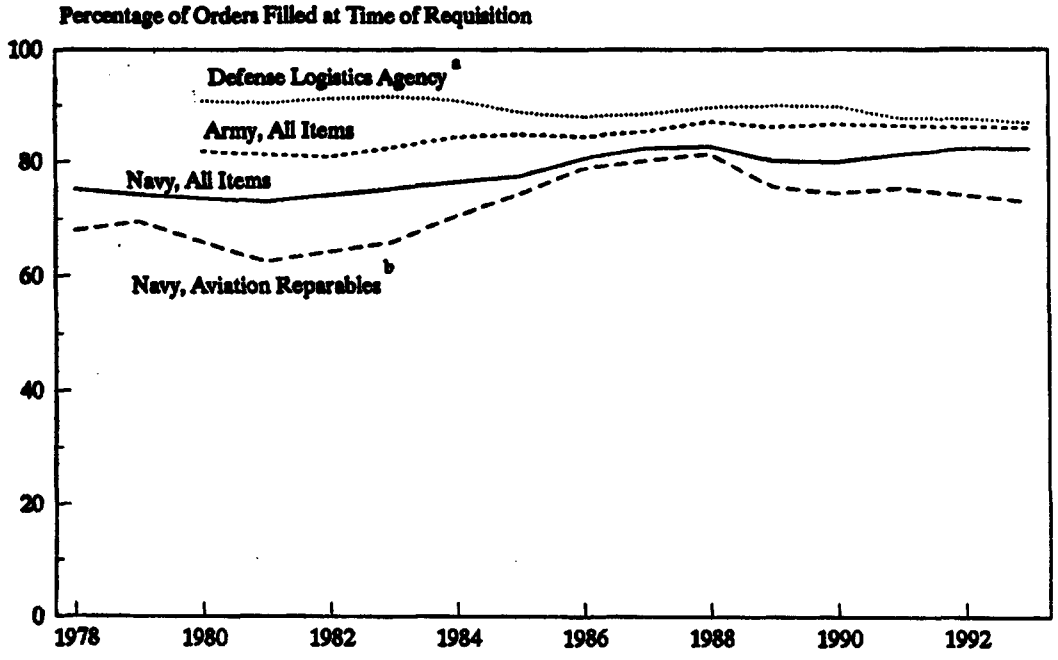
Financial Indicators of Supply System Adequacy

Supply system availability remains high for a variety of reasons unrelated to DoD's current purchases of spare parts. Reductions in the size of the force

10. Although the Air Force also reports a high rate (over 90 percent in 1993), the Air Force considers its data invalid and no meaningful historical trend can be traced.

11. Reparable secondary items are those spare parts or assemblies that are routinely repaired rather than discarded when damaged. Reparable spare parts are generally more expensive and complex than nonreparable ones.

FIGURE 18. WHOLESALE SUPPLY AVAILABILITY

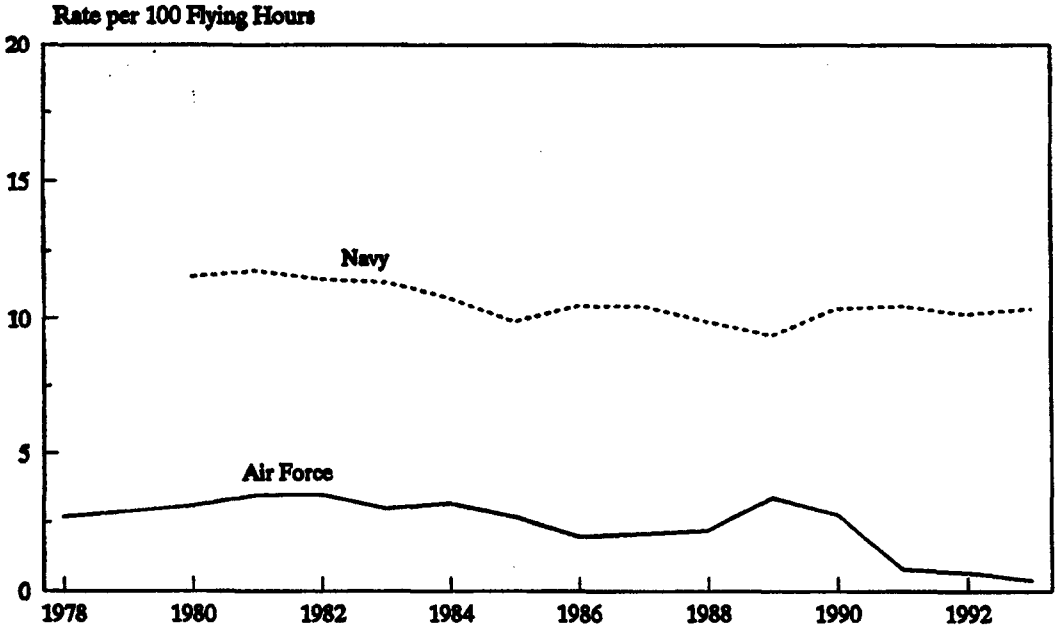


SOURCE: Congressional Budget Office based on Department of Defense data.

a. Fuel and food not included.

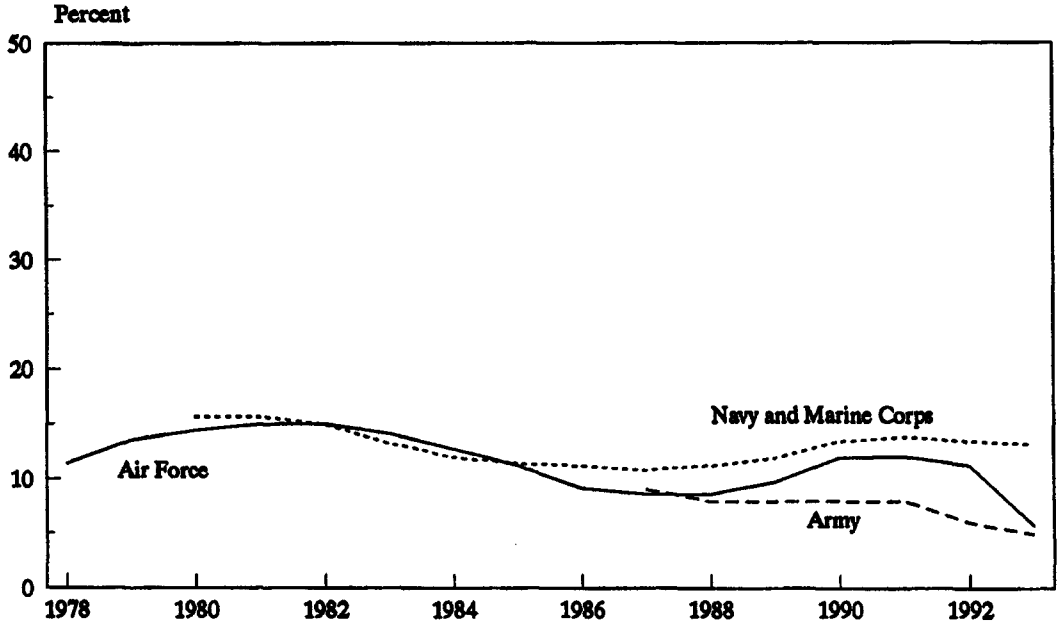
b. Includes Marine Corps aviation reparables.

FIGURE 19. AIRCRAFT CANNIBALIZATION ACTIONS



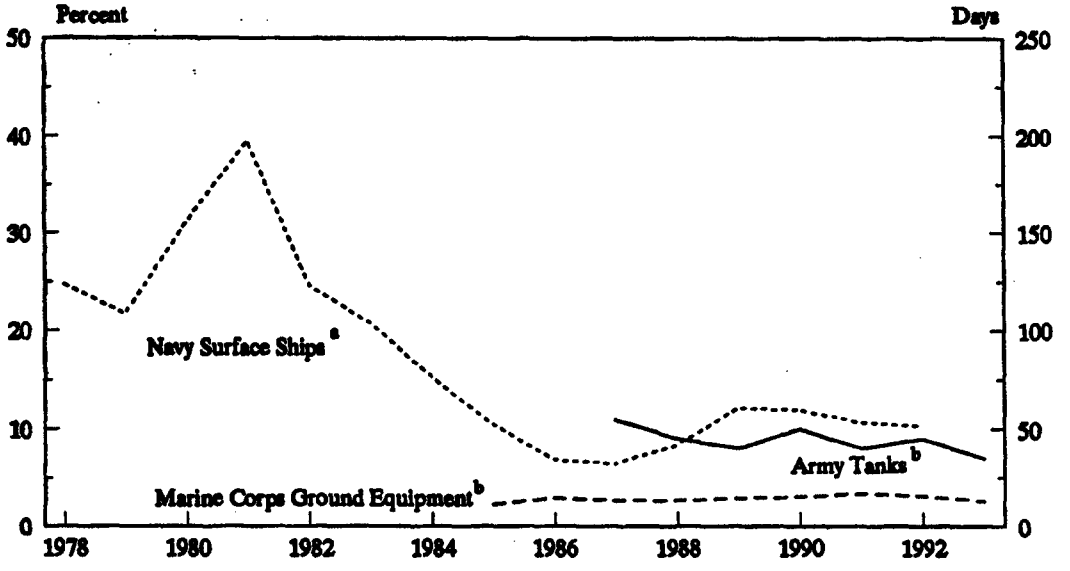
SOURCE: Congressional Budget Office based on Department of Defense data.

FIGURE 20. PERCENTAGE OF TIME AIRCRAFT ARE NON-MISSION CAPABLE BECAUSE OF SUPPLY PROBLEMS



SOURCE: Congressional Budget Office based on Department of Defense data.

FIGURE 21. DEGRADATION OF GROUND EQUIPMENT AND SHIPS BECAUSE OF SUPPLY PROBLEMS



SOURCE: Congressional Budget Office based on Department of Defense data.

a. Number of days down time (C-3 or C-4 CASREPs resulting from supply delays) per ship operating period (right axis).
b. Percentage of equipment non-mission capable because of supply problems (left axis).

have reduced demands on the supply system and caused materiel previously held by units to flow back into the system. Reductions in required war-reserve stocks have also freed up assets for distribution to units. Finally, DoD entered the drawdown from a strong inventory position. Adjusted for inflation and changes in the valuation methods used by DoD, the Defense Department's inventories of secondary items increased by 74 percent, or $52 billion, between 1981 and 1989. This growth--and DoD's apparent lack of control over its inventories, the subject of several reports by the General Accounting Office--led many people within DoD and the Congress to conclude that inventories could be reduced substantially even before the magnitude of the current drawdown in force structure became apparent.

The supply system is a revolving fund; it sells assets to the final consumers within DoD and then relies on receipts from those sales, rather than on direct appropriations, to replace its inventory. In each year since 1989, however, the ability of the wholesale supply system to use receipts to purchase replacement inventory has been restricted. Initially, the restriction was a matter of DoD policy and applied only to the Defense Logistics Agency (DLA). More recently, it has been enforced by legislation and applied throughout the Defense Department. In 1993 and 1994, the wholesale systems managed by the services and DLA were legally limited--albeit with a growing list of exceptions--to replacing no more than 65 percent of the inventory sold in the previous year.

In response to this and other initiatives, DoD's inventories of secondary items have declined from their 1989 peak. Assets purchased for Operation Desert Shield/Desert Storm, and flows of materiel back into the supply system as units are eliminated or as the services seek to minimize assets held outside the supply system, may have retarded this decline. Nonetheless, inventories of secondary items--adjusted for changes in reporting practices--fell by approximately $28 billion between 1989 and 1992 to a level of roughly $93 billion (in 1994 dollars). Active inventories (that is, inventories that can expect to be consumed within two years or that have been purchased to meet war-reserve requirements) declined by approximately $19 billion, or 21 percent. Inactive inventory, portions of which have been sold to customers outside DoD at scrap value, fell by approximately $9 billion, or 31 percent.

Yet DoD's total active inventory of secondary items, viewed relative to force structure, has not changed significantly since 1989. Active-duty manpower in the tactical and strategic Defense Planning and Programming Categories, a crude proxy for force structure, fell by 18 percent between 1989 and 1992. The 21 percent reduction in active inventories over the same period appears to be commensurate with the change in the force structure,

although an even greater decline in inventories might have been appropriate given that part of the decline results from accounting changes and that 1992 inventories are meant to satisfy the requirements of an even smaller force structure in the future.[12] Between 1989 and 1992, active inventories rose from 108 percent to 110 percent of DoD's approved acquisition objective, defined as the cost of those assets approved to meet peacetime and wartime requirements.

Problems could loom on the horizon, however, if external constraints on the supply system continue. Even without external constraints, DoD may have a strong incentive to restrict supply system purchases: in recent years, the department has come to depend on the excess cash that the supply system generates when it sells more than it buys to help pay for the flying hours, steaming days, and tank miles that support current readiness. If in fact DoD does have adequate incentives to pursue inventory reductions on its own, any externally imposed rule that limits its decisions is likely either to yield little savings (because DoD would have imposed similar internal limits in the absence of the rule) or to yield savings at the cost of readiness (because DoD would have chosen to purchase more, but only in order to meet its legitimate needs). In the view of some DoD officials, the 65 percent rule has not yet seriously affected readiness only because (taking into account purchases of goods for Operation Desert Shield/Desert Storm and the growing list of exceptions to the rule) the department would not have chosen to purchase much more in the absence of the limit.

REAL-PROPERTY MAINTENANCE

Declines in the quality of DoD's real property during the late 1970s--deteriorating buildings, airfields, utilities, and roads--are frequently cited as a characteristic of the hollow force. Because of efforts to maintain combat equipment and training, real-property maintenance was, according to some reports, particularly hard hit by shortfalls in operation and maintenance appropriations. According to Lt. Gen. Hans Driessnack, Comptroller of the Air Force in 1980, "The O&M problem probably had its greatest impact on real property maintenance.... The continued deterioration of facilities has a serious impact on readiness. In addition to affecting the morale of personnel, inadequate facilities create hazards and can damage or destroy

12. DoD changed the way it values its inventories between 1989 and 1992. The estimates presented here are adjusted to account for changes in its valuation of assets needing repair and potential reutilization/disposal stocks. They are not adjusted to account for DoD's shift to valuations based on latest acquisition costs rather than standard prices. As a result, the estimates may overstate the extent to which DoD reduced its inventories.

equipment. We cannot allow high-performance aircraft to operate on broken runways and rain to leak on operating electronic equipment."[13] Although the Congress directed DoD not to allow backlogs of real-property maintenance projects to rise above their 1978 level, the services found it hard to comply.

Defense analysts disagree about whether spending on real-property maintenance should be viewed as spending on readiness. Runway maintenance, for example, might be classified as an expenditure on readiness even if dormitory maintenance is not. Yet it may not matter for practical decisionmaking how these expenditures are categorized. Even if DoD could maintain highly ready forces at poorly maintained installations (an uncertain proposition), doing so would not prove cost-effective in the long run. Maintenance problems can snowball if not dealt with promptly; according to DoD estimates, the typical cost of a delayed project increases by 3 percent a year, even after adjusting for inflation. Moreover, morale and worker productivity depend in part on the physical working environment. Even in the competitive private sector, producers find that maintenance of their plant is a worthwhile investment. And although comparisons are difficult, DoD has historically appeared to spend a smaller percentage of its plant replacement value on maintenance than do firms in the private sector.[14]

Is DoD's current funding for real-property maintenance adequate? The growing backlog of unfunded projects since the late 1980s seems to suggest that it is not. The backlog of unfunded real-property maintenance projects, measured in inflation-adjusted dollars, will increase from $5.4 billion in 1988 to a projected $11.8 billion in 1994 (see Figure 22). In 1994, the DoD backlog will be roughly twice the size of the average backlog seen since 1980.

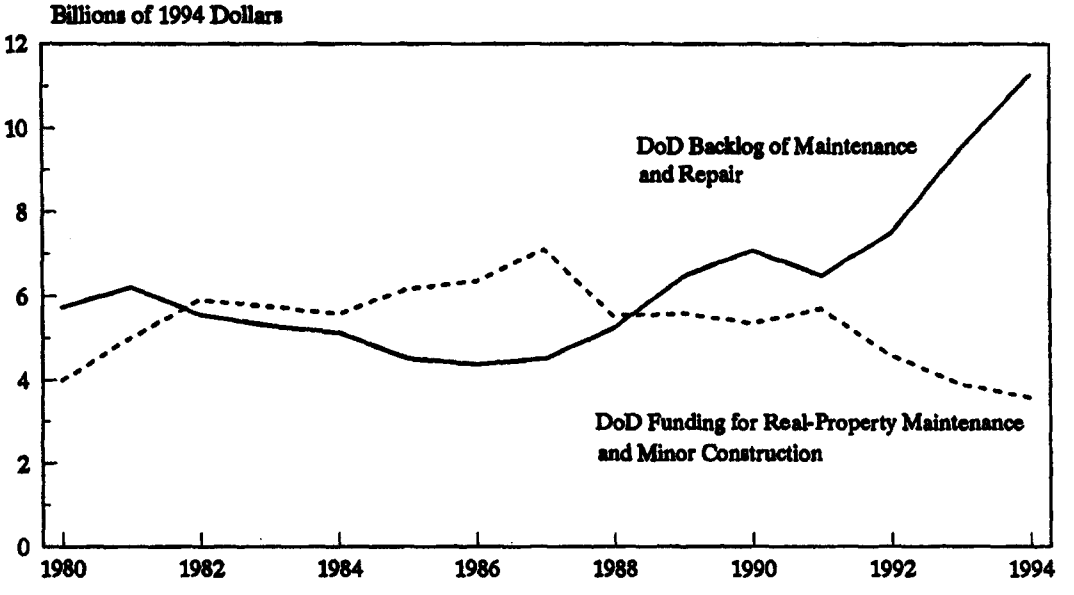
Measures of maintenance backlogs are notoriously imperfect. Yet trends in total expenditures and expenditures per square foot of buildings also suggest that current funding levels, adjusted for inflation, may be inadequate. In 1994, funding for real-property maintenance and minor construction will be roughly $3.6 billion--two-thirds of the average level since 1980. Funding per square foot is also well below the 1980-1994 average (see Figure 23). An increase in funding of 25 percent, or $900 million, would be required in 1994 to bring funding per square foot up to its historical average. (This estimate excludes the square feet of buildings that will eventually be taken out of DoD inventories in response to the base closures and realignments announced in 1991 and 1993.)

---

13. Lt. Gen. Hans H. Driessnack, "The Key to Readiness: O&M," *Air Force Magazine* (October 1980).

14. See Department of Defense, "Renewing the Built Environment," a report to the Congress (March 1989), p. 16.

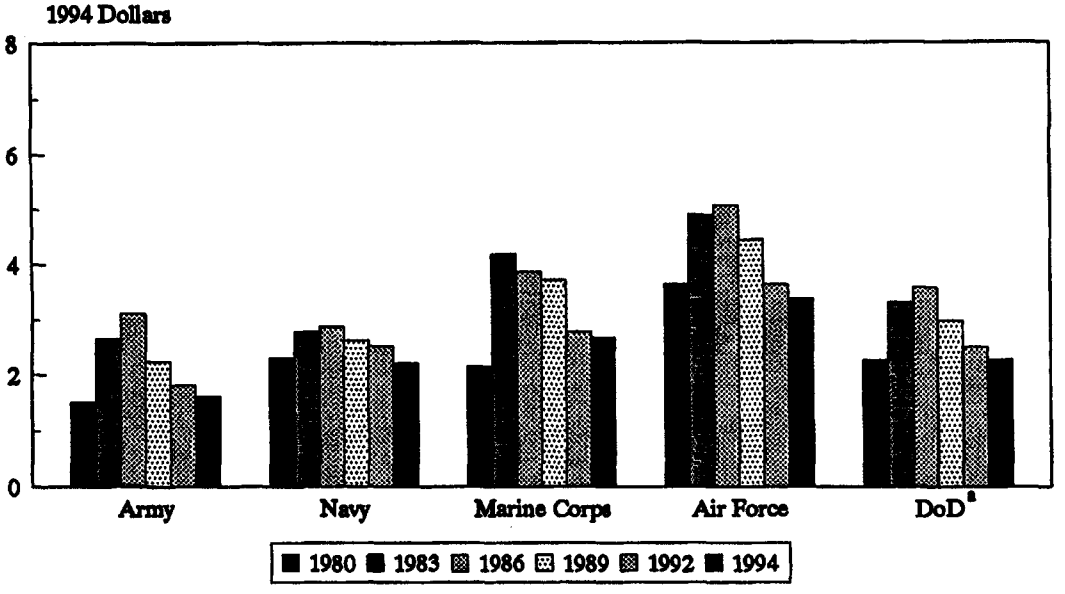
FIGURE 22. DOD FUNDING FOR REAL-PROPERTY MAINTENANCE AND BACKLOG OF UNFUNDED MAINTENANCE PROJECTS



SOURCE: Congressional Budget Office based on Department of Defense data.

NOTE: Includes active and reserve components in each service; excludes Defense agencies.

FIGURE 23. FUNDING FOR REAL-PROPERTY MAINTENANCE AND MINOR CONSTRUCTION PER SQUARE FOOT



SOURCE: Congressional Budget Office based on Department of Defense data.

NOTE: Data for each service include both active and reserve components.

a. Includes active and reserve components in each service; excludes Defense agencies.

The underlying problem might not be a shortage of funding, however, but an excess of facilities relative to current and projected numbers of personnel. Even if all buildings that will be affected by previously announced base closures and realignments were excluded from DoD's 1994 inventories, the number of square feet per active-duty service member would be 10 percent greater in 1994 than the average for 1980 through 1994. In the future, the number of square feet per active-duty member could increase even more, since DoD plans to reduce the number of active-duty personnel by 11 percent between 1994 and 1999. Thus, in order to recapture the historical relationship between square feet of buildings and number of military personnel, future base closures and realignments or other actions would have to reduce the number of square feet by roughly 21 percent by 1999. (Again, this figure is in addition to the reductions anticipated from closures that have already been announced.)

If such a reduction in facilities could be achieved, the current level of funding for real-property maintenance would be fairly close to what might be required to support the force in 1999 (although still 7 percent too low, based on the historical average of funding per square foot). It may be more realistic, however, to assume that DoD will not reduce its facilities to that extent. At bases that are downsized rather than closed, existing buildings represent a sunk cost. Even though DoD will not replace many existing buildings when they reach the end of their service lives, the department may find it worthwhile to continue to maintain and use buildings until that time. (Rather than reduce the square feet of troop housing, for example, the space allotted to each individual could increase.) Unless such increases are offset by reductions in maintenance costs per square foot as older buildings are removed from DoD's inventories, expenditures on real-property maintenance and minor construction will most likely have to rise in order to provide for future readiness.

CHAPTER IV

POSSIBLE IMPLICATIONS OF THE ANALYSIS

The Congressional Budget Office's analysis of current unit readiness indicators (C-ratings and mission-capable rates) and of resource indicators that are linked to future readiness provides some information about the current level of military readiness and possible future trends. At the same time, it gives information about the potential limitations of early-warning indicators and the need for measures of unit readiness that can be tracked consistently over time. Both kinds of information have important implications.

THE LIMITATIONS OF EARLY-WARNING INDICATORS AND THE NEED FOR BETTER MEASURES OF CURRENT READINESS

CBO examined trends in five resource areas that might provide early-warning signals of future readiness problems. That examination leads to the somewhat discouraging conclusion that--at least during a period in which force structure is declining rapidly--the Department of Defense's search for reliable early-warning indicators of readiness problems is unlikely to be very successful. Retention rates among career military personnel are being driven by DoD policy and may not reflect the level of morale among personnel or the attractiveness of military compensation. Rising depot maintenance backlogs do not necessarily signal a decline in future unit readiness. Total inventories of secondary items might conceivably increase even as the availability of spare parts required to support the most modern systems declines. Inadequate expenditures per square foot on real-property maintenance may be a signal that DoD has more property than it needs.

Formal quantitative models that attempt to predict mission-capable rates or C-ratings based on the relationship between funding levels and readiness that prevailed during the 1980s, when force structure was relatively stable, may prove similarly misleading. Although the impact of funding only 13 percent of depot requirements during a period of stable force structure may be clear, the impact today is uncertain. Moreover, because major drawdowns in the force structure are relatively rare, little information exists about the relationship between funding levels and readiness during such a period. These problems should not stop analysts from monitoring current resource trends and examining their implications for future readiness; they simply mean that the results of such efforts--including CBO's--are uncertain.

In the absence of reliable early-warning indicators, prudence might appear to dictate that any further cuts in the resources that support readiness be made gradually and cautiously. Yet the indicators of current unit readiness examined by CBO--C-ratings and mission-capable rates--are for the most part at high levels. To the extent that readiness is not a cliff but more of a slope, errors need not immediately result in a hollow force. It might be possible to monitor trends in current indicators, identify emerging problems, and respond before those problems become severe.

As DoD discovered during the early 1980s, however, and as CBO's survey confirms, the aggregate indicators of unit readiness used within DoD are not well suited to tracking changes in readiness over a number of years. Just as many indicators failed to fully reflect improvements in readiness during the 1980s, they may also fail to reflect declines during the 1990s. Alternatively, readiness indicators might show a spurious downward trend if greater emphasis on measuring readiness during the drawdown leads to more rigorous evaluation procedures. A strong case can be made that DoD should focus on developing better indicators of current unit readiness before attempting to identify early-warning indicators.

Efforts to improve the measurement of readiness could focus on better measures of the resources that units possess, improved models that use reported unit assets to attempt to predict intermediate measures of performance, or more comprehensive functional testing of units to see how well they can perform specific tasks.[1] Each of these approaches meets different needs. The C-rating system, for example, is based primarily on resource reporting. It is effective at providing the Joint Chiefs of Staff with up-to-the-minute information about how each unit commander perceives the resource status of his or her unit--essential information in the event that units must be deployed in a contingency.

More recently, the services have developed models that relate the level of resources held by units to intermediate outputs--such as the number of sorties a unit can generate or the number of artillery rounds it can deliver. These models provide insight into alternative resource levels and mixes that might enhance unit performance. Because they can consider resources held outside units, such models have the potential to look simultaneously at readiness and sustainability. Moreover, they can provide a more meaningful assessment of overall unit readiness than the Status of Resources and Training System, which relies on the resource area with the lowest C-rating. But these

1. For a discussion of these alternatives and ones that look at force readiness rather than unit readiness, see S. Craig Moore and others, "Measuring Military Readiness and Sustainability" (RAND, Santa Monica, California, 1991).

models are being continually modified as efforts are made to improve both the underlying structure of the models and assumptions about important parameters. As a result, they may be even less useful than C-ratings data for tracking trends in readiness over time.

During the current drawdown, both the Congress and the senior civilian leadership within DoD need access to measures of readiness that are objective, consistent over time, easily understood, and not dependent on assumptions that might be subject to even inadvertent manipulation. Officials concerned with setting broad resource constraints, rather than planning military operations, may find readiness measures that are credible and simple more useful than ones that are more realistic but also more complex.

Readiness measures based on how well units perform on tests that require them to carry out portions of their wartime tasks might appear to have the greatest potential for satisfying these needs. The use of a team of skilled evaluators from outside the unit (and including representatives from outside the service or component) could help to ensure consistency and objectivity in the readiness measures.[2] Such evaluations could be unscheduled and either be unannounced or allow the unit only as much time as it might expect to have to prepare for deployment in a contingency. Although performance testing is more expensive than resource reporting, only a random sample of each type of unit would need to be tested in order to obtain statistically reliable estimates of average readiness levels. Even a biennial sample would provide sufficient data to identify trends over time.

Each of the services already conducts some assessments of unit performance using evaluators from outside the individual unit, although advance notice is usually given. The Army Training Evaluation Program provides for evaluations of active units by nonunit personnel about every 18 months. The Marine Corps Combat Readiness Evaluation System provides for similar evaluations of both ground and air units. In the Air Force, Operational Readiness Inspections of air wings are conducted by outside evaluators who test both the ability of the unit to deploy and its ability to perform combat-related activities over roughly a four-day period.[3]

A system that provides for unscheduled and unannounced tests of a random sample of units--and that summarizes the results in a central DoD data base designed to track overall trends in readiness--is technically feasible.

---

2. Apart from the problem of possible bias, company commanders have many responsibilities other than SORTS reporting and may not be well informed about reporting rules.

3. Moore and others, "Measuring Military Readiness and Sustainability," p. 41.

Among the most critical analytic requirements would be selecting the wartime activities to be tested and weighting them to develop aggregate measures. Another important issue would be the need to preserve the anonymity of the individual commanders whose units were being tested. Even with this safeguard, however, such an approach could face major obstacles. Information about unit performance in operational tests has historically been guarded within each service and frequently within individual major commands. The services could be expected to resist the loss of control over information that a central DoD data base would imply, although that very lack of control might add to the credibility of the data.

Much of the information derived from such a data base would be highly classified and thus of limited usefulness in the public debate over readiness trends. Regardless of which measures DoD uses to assess readiness, however, it appears that the department needs to clarify its policies about classifying information on readiness and apply those policies consistently among the services. One approach--similar to that now followed in the Marine Corps and Air Force--might be to allow public access to information on readiness trends when that information is presented for an active or reserve component as a whole. (Information about aggregations of greater interest to potential adversaries--such as those units forward-deployed in any particular region--would remain classified.)

THE IMPLICATIONS OF TRENDS IN UNIT READINESS AND RESOURCES LINKED TO READINESS

Despite the limitations of DoD's measures of unit readiness, CBO's analysis concludes that readiness is now at a high level. U.S. forces are not, as some have suggested, on the ragged edge of readiness. One interpretation is that the risks associated with further cuts in readiness-related spending are not as great as they would otherwise be. That interpretation, however, is subject to a number of limitations. Some readiness indicators--including C-ratings for Navy surface ships--have declined from their peaks in the late 1980s. Moreover, CBO examined only those data that are publicly available; operational tests or models that predict unit performance based on inputs might provide additional useful information.

In addition to looking at trends in overall unit readiness, this paper surveys a number of resource areas that contribute to both current and future readiness and that have been of concern in the ongoing defense debate. That survey yields mixed results. The review of personnel quality, aggregate levels of spending for operation and maintenance, total DoD depot maintenance

funding, and inventories of secondary items all suggest that DoD may in fact be providing adequate support for future readiness. Yet there are indications of weaknesses in at least two activities--depot maintenance in the Navy and real-property maintenance for DoD as a whole--that are funded out of the operation and maintenance accounts.

Based on historical standards, the current level of funding for depot maintenance in the Navy and real-property maintenance in DoD as a whole appears to be too low for today's force structure. Instead, it is commensurate with what will be required to support the force structure that the Defense Department plans for 1999. As a result, even if DoD succeeds in eliminating excess facilities, it may not be able to reduce spending in these areas below the current level. Indeed, an increase in funding for real-property maintenance might be needed to ensure that DoD facilities can be adequately maintained in the future. During a drawdown in the force structure, however, providing additional resources in these areas might not contribute to readiness but simply encourage DoD to maintain an inefficient infrastructure, with too many square feet of buildings and too many shipyards and maintenance depots.

Even if this survey of resource areas did not yield mixed results, its implications for total readiness funding would still be uncertain. CBO looked at resource areas that are being singled out in the ongoing debate as being of special concern. It did not attempt to examine other activities that could contribute to current and future readiness, such as unit operating tempos (steaming days, flying hours, and tank miles) or the adequacy of unit training in general. Although the resource areas surveyed in this paper could account for much of any possible requirement for additional readiness funding, there may be as yet unrecognized problems in other resource areas.

Even more important, this paper, like much of the ongoing defense debate, focuses on readiness and on providing an early warning of the kinds of problems that plagued the force in the 1970s. The problems that DoD faced after the Vietnam drawdown, however, are not necessarily the same ones that it might face as a result of the current drawdown. Because readiness is now the Department of Defense's highest priority, if any imbalance in military capability were to appear during the 1990s, it might well take the form of a force that was too small, not sufficiently modern, or not sustainable, rather than one that was not ready.

APPENDIX

NUMERICAL DATA FOR SELECTED READINESS INDICATORS

The tables in this appendix present numerical data on C-ratings and mission-capable rates. They include all of the data used to prepare Figures 1 through 5 of this paper as well as some more detailed data series. This historical information, which is not available in any single data base in the Department of Defense, may be of use to analysts outside the Congressional Budget Office.

TABLE A-1. PERCENTAGE OF UNITS REPORTING C-1 OR C-2 RATINGS OVERALL

Type of Unit	1978	1979	1980	1981	1982	1983	1984	1985
Active Component								
Air Force	n.a.	n.a.	63	n.a.	n.a.	n.a.	76	81
Navy aviation index[a]	71	77	34	23	29	64	77	90
Navy surface ships index[a]	60	64	55	44	57	72	79	86
Marine Corps	n.a.	n.a.	70	n.a.	n.a.	n.a.	66	75
Army[b]	n.a.	n.a.	37	n.a.	n.a.	n.a.	n.a.	n.a.
Reserve Component[c]								
Air Force Reserve	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	49	48
Air Force Guard	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	49	58
Marine Corps Reserve	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	16	25

(Continued)

SOURCE: Congressional Budget Office. Data for 1980 are from Melvin Laird, *The Problems of Military Readiness* (Washington, D.C.: American Enterprise Institute, 1980). All other data are from the Department of Defense.

NOTE: n.a. = not available.

TABLE A-1. CONTINUED

Type of Unit	1986	1987	1988	1989	1990	1991	1992	1993
Active Component								
Air Force	89	90	93	95	90	86	91	92
Navy aviation index[a]	85	85	85	95	100	98	84	81
Navy surface ships index[a]	94	100	94	91	78	91	89	79
Marine Corps	77	79	75	70	72	76	76	67
Army[b]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Reserve Component[c]								
Air Force Reserve	51	62	86	91	95	95	94	92
Air Force Guard	74	78	89	92	94	95	96	95
Marine Corps Reserve	27	34	46	51	51	45	29	37

a. These unclassified indexes show changes in the percentage of units reporting C-1 or C-2 relative to their peak values; they do not show the actual percentage of units that are C-1 or C-2. The peak value for aviation units was in 1990, so the aviation index in that year has a value of 100. The peak value for surface ships was in 1987, so the surface ship index has a value of 100 in that year. An index value of 50 means that in that year the percentage of units reporting C-1 or C-2 was half of its peak value.

b. Army data for 1981 through 1993 are classified.

c. Data for the Army Guard, Army Reserve, and Naval Reserve are not available in an unclassified form.

TABLE A-2. INDICATORS OF WEAPON SYSTEM AVAILABILITY

Type of Unit	1980	1981	1982	1983	1984	1985	1986
Mission-Capable Rates for Aircraft							
Air Force[a]							
All aircraft	66.3	66.1	66.8	68.2	70.9	74.7	77.8
Fighters	65.0	64.4	66.3	68.5	72.6	76.1	77.0
Bombers	51.6	50.1	44.1	42.7	40.9	45.5	69.1
Tanker/airlift	67.5	67.0	65.3	65.0	65.5	68.9	72.6
Other	69.1	70.0	71.2	73.0	75.1	79.7	83.9
All Navy and Marine Corps Aircraft[a]	58.5	59.2	62.4	66.5	69.5	71.2	72.7
Marine Corps[a]							
Fixed-wing aircraft	58.5	58.0	65.2	68.9	67.7	72.0	76.6
Rotary-wing aircraft	63.3	65.7	72.6	75.4	78.9	78.5	80.1
Army Rotary-Wing Aircraft[b]	n.a	n.a	n.a	n.a	n.a	n.a	n.a.
Fully-Mission-Capable Rates for Aircraft							
All Navy and Marine Corps Aircraft[a]	37.1	37.2	41.7	48.0	52.9	56.2	59.7
Marine Corps[a]							
Fixed-wing aircraft	34.8	33.6	43.9	50.2	57.0	57.5	65.5
Rotary-wing aircraft	41.9	44.3	57.6	65.1	69.8	71.2	73.1
Mission-Capable Rates for Ground Equipment							
Army Systems[b]							
Tanks	86	n.a.	87	n.a.	87	n.a.	86
Fire-support artillery	88	n.a.	90	n.a.	89	n.a.	93
Fire-support missile systems	91	n.a.	96	n.a.	94	n.a.	92
Combat and combat-support vehicles	88	n.a.	85	n.a.	88	n.a.	91
Marine Corps Ground Equipment[b]	85.2	87.8	88.2	89.7	90.6	91.5	93.2
Percentage of Time Ships Are Free of Significant Equipment Failures[c]							
Navy[b]							
All surface ships	58.0	50.0	57.0	63.0	66.0	75.0	79.0
Surface combatants	51.0	43.0	50.0	57.0	62.0	71.0	77.0

(Continued)

SOURCE: Congressional Budget Office based on Department of Defense data.

NOTE: This table reflects those aggregate measures of weapon system availability that CBO was able to obtain before the publication of this paper. It does not include all of the measures used within DoD.

TABLE A-2. CONTINUED

Type of Unit	1987	1988	1989	1990	1991	1992	1993
Mission-Capable Rates for Aircraft							
Air Force[a]							
All aircraft	80.6	81.2	79.6	84.6	84.8	85.9	86.5
Fighters	80.2	81.0	85.1	88.1	85.1	83.8	82.0
Bombers	72.1	71.4	86.6	88.1	76.6	84.8	80.3
Tanker/airlift	78.8	79.6	84.2	82.5	76.6	74.6	82.3
Other	83.8	84.3	84.4	85.7	84.6	84.3	85.4
All Navy and Marine Corps Aircraft[a]	73.3	73.0	72.4	69.9	68.4	69.0	71.2
Marine Corps[a]							
Fixed-wing aircraft	79.0	72.7	76.1	74.4	75.9	74.2	81.2
Rotary-wing aircraft	81.2	73.6	72.4	65.9	67.4	69.4	78.0
Army Rotary-Wing Aircraft[b]	72.0	73.0	72.0	72.0	72.0	72.0	72.0
Fully-Mission-Capable Rates for Aircraft							
All Navy and Marine Corps Aircraft[a]	61.9	62.0	61.8	60.1	58.5	59.0	61.1
Marine Corps[a]							
Fixed-wing aircraft	69.8	61.7	68.3	67.4	68.4	67.2	73.6
Rotary-wing aircraft	75.1	64.9	63.1	55.4	56.3	58.7	70.3
Mission-Capable Rates for Ground Equipment							
Army Systems[b]							
Tanks	84	88	86	87	87	87	90
Fire-support artillery	92	93	93	93	93	95	95
Fire-support missile systems	91	92	92	92	90	92	95
Combat and combat-support vehicles	91	92	91	91	88	88	88
Marine Corps Ground Equipment[b]	92.8	91.4	90.9	89.9	91.5	89.4	89.6
Percentage of Time Ships Are Free of Significant Equipment Failures[c]							
Navy[b]							
All surface ships	81.0	76.0	68.0	66.0	70.0	69.0	68.0
Surface combatants	79.0	75.0	66.0	63.0	68.0	69.0	67.0

a. Active and reserve components.
b. Active component only.
c. Percentage of time free of critical mission-degrading (C-3 or C-4) casualty reports (CASREPs).